In this table, column 1 gives the auroral and the Fraunhofer lines; column 2, the number of these as measured upon the scale of the spectroscope used; column 3, the wave-lengths of these lines obtained as above stated; column 4, the wave-lengths of the auroral lines, given by themselves; and column 5, the wave-lengths of what I assume to be the same lines, with their wave-lengths as measured by the observers mentioned.

The point of particular interest in this observation is the fact that the line (4) of wave-length 502 is not laid down in any authority accessible to me as having been observed in the auroral spectrum. Indeed, no previous observer, so far as I know, has seen any auroral line between the Fraunhofer lines *b* and F. Professor C. A. Young (*Journal of Science and Art*, III. ii. 332, Nov., 1871) gives two lines—Nos. 56 and 57, or 1866·8 and 1870·3 of Kirchhoff—observed by him in the sun's chromosphere and also by Rayet in the eclipse of 1868, one of which may coincide with this fourth auroral line.

New Haven, Nov. 13 GEORGE F. BARKER

SCIENTIFIC SERIALS

THE *Geological Magazine*, Nos. 86—89, August to November 1871. This valuable magazine continues to furnish us every month with important and interesting articles upon subjects belonging to the various departments of geology. In the first number now before us we find an interesting paper on volcanoes by the editor, Mr. H. Woodward, and a particularly valuable article by Mr. J. W. Judd on the anomalous mode of growth of certain fossil oysters. In the latter, which is illustrated with a plate, the author notices those oysters from various secondary deposits, in which the shell has acquired throughout the peculiar sculpture of some ammonite, *Trigonia*, or other shell, to which its lower valve has adhered during growth.—In the September number the most interesting paper is Mr. Woodward's description of a new Arachnide from the Dudley coal-measures. This animal, to which the author gives the name of *Eophrynus Prestvicii*, is most nearly allied to the existing genus *Phrynus*, and the specimen is remarkable for the beautiful preservation of the casts of both surfaces.—Among the contents of the October number we must call particular attention to Dr. Murie's article on *Sivatherium*, in which the author discusses the characters of that most remarkable animal, which he regards as most nearly allied to the Saiga antelope, the latter being placed by him at the central point of ramification of the hollow-horned ruminants, and leading from the ruminants towards the Pachyderms through the Tapir. This valuable memoir is illustrated with two plates, one representing the skeleton of the animal, the other giving an ideal restoration of the living aspect of the male, female, and young of this gigantic ruminant.—The November number opens with a biographical notice (with a portrait) of Sir Roderick Murchison, followed by a shorter one of Mr. Charles Babbage. The other articles contained in it are on relics of the Carboniferous and other old land-surfaces, by Mr. Woodward; on the prospects of coal south of the Mendips, by Messrs. Bristow and H. B. Woodward; on the futile search for coal near Northampton, by Mr. S. Sharp; and on the Foraminifera of the Cretaceous rocks, by Messrs. T. Rupert Jones and W. K. Parker.

THE *Journal of Botany* for November commences with an interesting contribution to historical botany; in a paper read by the late Robert Brown before the Edinburgh Natural History Society in 1792 on "The Botanical History of Angus" never before printed. It was probably his first contribution to botanical science, having been written when he was about eighteen years old. Prof. Thiselton-Dyer contributes some observations on "Fungi parasitic upon *Vaccinium Vitis-Idæa*," and Mr. A. W. Bennett "Further observations on Protandry and Protogyny," in continuation of his previous researches on this subject. Mr. T. A. Briggs has a note on an undescribed species of *Rubus*, and the remainder of the number is filled up with short notes, abstracts, extracts, and reviews.

The number for December opens with the commencement of a paper by Mr. J. G. Baker "On the Botany of the Lizard Peninsula." Although this district is well known to botanists as the habitat of many very rare and local plants, yet no detailed account has yet been published of the flora of this portion of Cornwall. From the idea that many plants very common in other parts of England would find their limit short of this south-western extremity of the island, a list is here given of every flowering plant observed during a three days' visit, accompanied by general remarks on the peculiarities of the flora, both in what it includes and in what is absent from it. The only other original paper of importance in the number is a new arrangement by the Rev. J. C. Leefe of the English species of the extremely difficult genus *Salix*.

Journal of the Royal Geological Society of Ireland. Part 1, vol. iii. new series (vol. xiii.), has just been published. It contains besides the Report of Council for 1870-71, J. Emerson Reynolds on two remarkable Crystals of Galena; G. H. Kinahan, additional notes on Foliation, and supplementary notes on some of the Drift in Ireland; R. G. Symes, on the Geology and extinct Volcanoes of Clermont, Auvergne—plates i. ii. iii.; W. H. Baily, on the genus *Pleurorhynchus*, and a new species—plate iv.; M. H. Ormsby, Analyses of some Granite Rocks from India, and of their constituent minerals (1668); Edwd. T. Hardman, Analysis of Trachyte Porphyry from Tardree near Antrim, and on the Analysis of a Limestone compared with that of the same rock where it is in close proximity to a Doloritic Dyke; R. C. Tichborne, note on the Geological Formation of some of the Tiroxides.

Journal of the Chemical Society, October.—This number does not contain any papers originally communicated to the Society. The abstracts of foreign papers, however, occupy nearly 100 pages, and comprise many subjects of interest. The importance of the work done this way by the Chemical Society can scarcely be estimated; the journal must now be of great value not only to the chemist, but also to the physicist, physiologist, and to the chemical manufacturer, for many papers in these subjects are abstracted fully. An abstract of M. Berthelot's paper on the heat evolved in the formation of organic derivatives of nitric acid is very interesting. It is shown that in the formation of nitroglycerine, a very small amount of heat is evolved, as compared with that evolved in the formation of gun-cotton or nitrobenzine. This will account for the ready decomposition of the former, and the formidable effects produced by its decomposition. Amagat has experimented on the compressibility and dilatation of sulphurous and carbonic anhydrides; he finds that they first begin to act as perfect gases at a temperature of 250° C. Several of the abstracts contained in this number have already been noticed in these pages. One of them deserves especial notice, by Friedel and Ladenburg, on silicopropionic acid; this body is the first in which the group CO_2H contained in organic acids has been replaced by the corresponding group SiO_2H. Amato has obtained a curious compound, glucosophosphoric acid, the sodium salt of which has the composition $C_6H_{11}O_5Na_2PO_4$. Waage has published a paper on the use of bromine in chemical analysis, in which he points out that this reagent can be substituted with advantage for chlorine in many instances; it is very useful in decomposing pyrites, the whole of the sulphur being easily oxidised. We find an abstract of Bischof's paper on Fire Clays, which appears to deal very practically with this most important subject.

THE part just issued of the *Transactions of the Linnean Society*, completing vol. xxvii., contains three papers, of two of these, "Revision of the Genus *Cassia*," by Mr. G. Bentham, the president, and "Contributions to the Natural History of the *Passifloreæ*," by Dr. M. T. Masters, abstracts have already appeared in our columns. The remaining paper, "Notes on the Reptiles, Amphibia, Fishes, Mollusca, and Cretacea, obtained during the Voyage of H.M.S. *Nassau* in the years 1866-69," by Dr. Cunningham, contains descriptions of several new species collected and named by the naturalist to the expedition, and notes on the habits, localities, and characters of many other species. All these papers are illustrated by plates.

The first part of Volume xxviii. is also published, consisting of only a single paper, Dr. Triana's monograph of the *Melastomaceæ*. After some general remarks on the order, and on each of the genera comprised within it in French, follows an enumeration of the species, with the synonymy, references to type specimens in the principal herbaria, and fresh descriptions of new or badly-described species. It is illustrated by seven plates.

THE *Bulletin of the Royal Academy of Sciences of Belgium* for September and October, 1871 (Tom. xxxii., Nos. 9 and 10), contains but little scientific matter.—M. J. C. Houzeau communicates a description of a method of measuring directly the

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distance of the centres of the Sun and of Venus during the transits of that planet.—M. P. J. Van Beneden describes a new Sirenian from the Rupelian stage. The remains of this animal were obtained at Elsloo, near Maestricht, and consist of a portion of the cranium, one dorsal vertebra, and a series of seven caudal vertebræ. These are described and figured by M. Van Beneden under the name of *Crassitherium robustum;* he regards it as more nearly allied to the *Stelleræ* than to the Manatees and Dugongs. M. Van Beneden also notices the occurrence at Basel near Rupelmonde of a nearly complete skeleton of a Sirenian in brick-clay, and remarks upon the constant association of remains of *Squalodon* with those of Sirenians wherever the latter have been found in Europe. He also notices some points in the osteology of living Sirenia.—M. E. Van Beneden gives us a note on the preservation of the lower animals, in which he recommends the employment of solutions of osmic acid and picric acid for the preservation of the more delicate forms of animal life, such as the Medusæ, Ctenophora, &c. According to him these processes are most successful.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, December 21.—"Contributions to the History of Orcin.—No II. Chlorine and Bromine-substitution Compounds of the Orcins." By John Stenhouse, F.R.S.

"Note on Fucusol." By John Stenhouse, F.R.S.

Mathematical Society, December 14.—Dr. Spottiswoode, president, F.R.S., in the chair. Mr. K. Freeman, of St. John's College, Cambridge, was elected an ordinary member, and the following gentlemen foreign members of the Society:—Dr. Clebsch, M. Hermite, Prof. Cremona, Dr. Hesse, and Prof. Betti. Dr. Sylvester explained the methods he had employed in his paper, "On the theorem that an arithmetical progression which contains more than one contains an infinite number of prime numbers." The communication was limited to the case of arithmetical progressions proceeding according to the common difference, 4 or 6. The method employed appears to differ fundamentally from Dirichlet's method (Berlin Transactions, 1837). [In the account of Dr. Sylvester's previous communication to the Mathematical Society, given in NATURE, Nov. 23, p. 75, at line 18 from the commencement of the paragraph, for *intention* read *induction*, and at line 20 from the foot of the page, for the words *the magnitude* read *the order of the magnitude.*] Profs. Cayley and H. J. S. Smith took part in a discussion on the subject.—Prof. Clifford next spoke with reference to a paper, he is preparing for the society.—Prof. Cayley then drew attention to the question of the determination of the surfaces capable of division into infinitesimal squares by means of their curves of curvature. It was shown by M. Bertrand that in a triple system of orthotomic isothermal surfaces each surface possesses the property in question, of divisibility into squares by means of its curves of curvature. But in such a triple system each surface of the system is necessarily a quadric. There is nothing to show that the property is confined to quadric surfaces, and the question of the determination of the surfaces possessing the property appears to be one of considerable difficulty, and which has not hitherto been examined. —Mr. S. Roberts exhibited a thread model of a homographic transformation of the developable surface which circumscribes a system of compound quadrics. The surface is generated by planes touching an ellipse at a constant inclination, and its equation is obtained by writing $p^2 z^2$ for r^2 in $\phi(x^2, y^2, r^2) = 0$ representing the plane parallel of an ellipse.

Anthropological Institute, December 18.—Dr. Charnock, president, in the chair. Lord Dunraven, Dr. John Best, and Mr. J. Kempe were elected members. A paper was read by Mr. Joseph Kaines on the "Anthropology of Auguste Comte." The sources of the paper were to be found in chapters on "Biology" and "Fetishism" of M. Comte's *Philosophie Positive* and in the *Politique Positive*. The paper itself aimed to show that the differences between man and the rest of the animal kingdom were not so great as they were usually represented, nor in fact were they so numerous in their resemblances. Treating man as the head of the zoological series, it argued that his dominion over animals was from primitive times (and is now) a moral dominion rather than intellectual, and it concluded, that in so far as external nature was used by man for moral ends, it was rightly used, and that the intellect found its true work in directing his affective nature to moral purposes and relationships.

Linnean Society, December 21.—Mr. G. Bentham, F.R.S., president, in the chair. "On the Anatomy of the American King-Crab (*Limulus polyphemus*, Latr.)," by Prof. Owen, F.R.S. The author, referring to anatomies of existing species of animals elucidating the type of structure of large extinct groups—as that of *Apteryx* in reference to the *Dinornithidæ;* of *Protopterus* in relation to the notochordal, protocercal Cycloganoids of palæozoic beds; of *Nautilus* as the representative of the constructors of extinct chambered and siphonated shells; of *Orbicula*, *Discina*, and *Terebratula*, in like relation to extinct *Brachiopoda*—stated that, in reference to the Trilobite Crustacea, he had once doubted whether *Serolis* or *Limulus* would reflect most light on the internal structure of those ancient forms of the class. But, in the 14th lecture of the Hunterian Course of 1843, published in April of that year, appreciating the importance of the character by which the Xiphosures and Trilobites agreed in differing from *Malacostraca*, viz., in the numerical formula of segments, he decided to take *Limulus* in hand. Isopodal tendencies in Trilobites indicated, however, their more generalised character, and continued palæontological research led to the postponement of the original purpose, until the subsequent discoveries of a palæozoic group of Crustacea, due mainly to the labours of Salter, Huxley, and Woodward, decided the author no longer to delay the present communication, in view of its more special bearings upon the *Merostomata* of the last-named carcinologist. Of the external characters of *Limulus* but little was left to describe. The author accepted the evidence of the homologies of the three divisions of the body adduced by Dana, Spence Bate, and Woodward as outweighing that which influences V. der Hoeven. The "cephalothorax" of the latter author was the "cephalon," the second division was, not the "abdomen," but the "thorax," of the later carcinologists. The determination by the latter of the articulated appendages of the foremost division of the body of *Limulus* was also adopted. But as that division includes not only the brain, organs of sense, mouth, and manducatory instruments, but also the stomach, liver, major part of the heart, and genital organs, together with a long tract of the ventral ganglionic neural chords or centres, the author proposed to speak of it as the "cephaletron," the succeeding division as the "thoracetron," for the spine-shaped part he adopted Spence Bate's term of "pleon." In the description of the cephaletron, its modifications enabling it to act effectively as a burrowing digger or spade were dwelt upon, and the modifications of the hind border which articulates with the thoracetron were pointed out, showing that whilst by coalescence it was part of the foremost division in all its formal characters, more especially its upper pair of entapophysial pits and under pair of coalesced lamelliform appendages, it belonged to the series of lamelligerous segments constituting the thoracetron. The author then proceeded to give a detailed account of the muscular system of *Limulus*, and concluded this third section of the paper, by condensing notes made by Mr. Lloyd, of the Crystal Palace Aquarium, on the movements of living *Limuli* in captivity, and those made by Mr. Lockyer in New Jersey on the *Limulus polyphemus* in its native seas. The reading of this memoir will be continued at a subsequent meeting of the Linnean Society.

MANCHESTER

Literary and Philosophical Society, November 28.—Dr. J. P. Joule, F.R.S., vice-president, in the chair. "Encke's Comet and the Supposed Resisting Medium," by Professor W. Stanley Jevons. The observed regular diminution of period of Encke's comet is still, I believe, an unexplained phenomenon for which it is necessary to invent a special hypothesis, a *Deus ex machina*, in the shape of an imaginary resisting medium. I cannot be sure that the suggestion I am about to make has not already been made, but I have never happened to meet with it; and therefore I venture to point out how it seems likely that the retardation of the comet may be reconciled with known physical laws. It is asserted by Mr. R. A. Proctor, Prof. Osborne Reynolds, and possibly others, that comets owe many of their peculiar phenomena to electric action. I need not enter upon any conjectures as to the exact nature of the electric disturbance, and I do not adopt any one theory of cometary constitution more than another. I merely point out that if the approach of a comet to the sun causes the development of electricity arising from the comet's motion, a certain resistance is at once accounted for.

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